

November 8, 2004

Mr. Daniel J. Malone
Site Vice President
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR POWER PLANT - ISSUANCE OF EMERGENCY
AMENDMENT RE: ADDITIONAL RESTRICTIONS TO PRIMARY COOLANT
SYSTEM COOLDOWN RATE LIMITS (TAC NO. MC4992)

Dear Mr. Malone:

The U. S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 218 to Facility Operating License No. DPR-20 for the Palisades Nuclear Plant. The amendment consists of changes to the Technical Specifications (TS) in response to your application dated November 2, 2004. This request was treated as an emergency amendment in accordance with 10 CFR 50.91(a)(5).

The amendment revises TS Limiting Condition for Operation 3.4.3, "Primary Coolant System (PCS) Pressure and Temperature (P/T) Limits," to add restrictions to the cooldown rate limits. This amendment supports plant restart following repairs of reactor vessel closure head control rod drive nozzle penetrations 29 and 30 at the Palisades Nuclear Power Plant.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

John F. Stang, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosures: 1. Amendment No. 218 to DPR-20
2. Safety Evaluation

cc w/encls: See next page

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Palisades Plant

cc:

Robert A. Fenech, Senior Vice President
Nuclear, Fossil, and Hydro Operations
Consumers Energy Company
1945 Parnall Rd.
Jackson, MI 49201

Arunas T. Udry, Esquire
Consumers Energy Company
1 Energy Plaza
Jackson, MI 49201

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4351

Supervisor
Covert Township
P. O. Box 35
Covert, MI 49043

Office of the Governor
P. O. Box 30013
Lansing, MI 48909

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
Palisades Plant
27782 Blue Star Memorial Highway
Covert, MI 49043

Michigan Department of Environmental Quality
Waste and Hazardous Materials Division
Hazardous Waste and Radiological
Protection Section
Nuclear Facilities Unit
Constitution Hall, Lower-Level North
525 West Allegan Street
P.O. Box 30241
Lansing, MI 48909-7741

Michigan Department of Attorney General
Special Litigation Division
525 West Ottawa St.
Sixth Floor, G. Mennen Williams Building
Lansing, MI 48913

Manager, Regulatory Affairs
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

Director of Nuclear Assets
Consumers Energy Company
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043

John Paul Cowan
Executive Vice President & Chief Nuclear
Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Douglas E. Cooper
Senior Vice President - Group Operations
Palisades Nuclear Plant
Nuclear Management Company, LLC
27780 Blue Star Memorial Highway
Covert, MI 49043

October 2003

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-255

PALISADES PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 218
License No. DPR-20

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Nuclear Management Company, LLC (the licensee), dated November 2, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public; and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to the license amendment and Paragraph 2.C.(2) of Facility Operating License No. DPR-20 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 218, are hereby incorporated in the license. NMC shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of the date of issuance and shall be implemented immediately.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

L. Raghavan, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: November 8, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 218

FACILITY OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change:

REMOVE

3.4.3-4

INSERT

3.4.3-4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 218 TO FACILITY OPERATING LICENSE NO. DPR-20
NUCLEAR MANAGEMENT COMPANY, LLC
PALISADES NUCLEAR PLANT
DOCKET NO. 50-255

1.0 INTRODUCTION

By application dated November 2, 2004, the Nuclear Management Company, LLC (NMC or the licensee), requested changes to the Technical Specifications (TS) for the Palisades Nuclear Power Plant (PNPP). The proposed changes would add restrictions to the cooldown rate limits in TS, Limiting Condition for Operation (LCO) 3.4.3, "Primary Coolant System (PCS) Pressure and Temperature (P/T) Limits." This amendment supports plant restart following repairs of two reactor vessel closure head (RVCH) control rod drive (CRD) nozzle penetrations at the PNPP. The licensee requested that the proposed amendment be processed as an emergency amendment as discussed in Section 4.0 of this safety evaluation.

By letter dated August 2, 2004, the licensee requested relief from certain sections of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1989 Edition. The licensee requested two reliefs pertaining to the repair of the reactor vessel head penetrations. The licensee submitted the relief requests in the event that a reactor vessel head nozzle penetration would potentially require repair.

During the current refueling outage, the licensee inspected the reactor vessel head and penetrations in accordance with U. S. Nuclear Regulatory Commission (NRC) Order EA-03-009. During the inspection, the licensee identified through-weld cracks in the Inconel buttering adjacent to the J-weld on control nozzle penetrations 29 and 30. The licensee determined that penetrations 29 and 30 would require repair, and that the relief was required.

The initial results from the evaluations supporting the repairs of the CRD nozzles concluded that the Code requirements were satisfied. While performing the final reviews of the weld repair implementation modification package on the CRD nozzles, the licensee discovered that the fracture toughness criteria of the 1989 ASME Section XI Code could not be met. Therefore, with the existing TS, the PCS cool down rate limits would not protect the integrity of the repairs of the RVCH. Therefore, to protect the integrity of the RVCH, additional restrictions to the cooldown limits would have to be added to the TS.

2.0 REGULATORY EVALUATION

The NRC has established requirements in 10 CFR Part 50 to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. The NRC staff evaluates the pressure-temperature (P-T) limit curves based on the following NRC regulations and guidance: Appendix G to 10 CFR Part 50; Generic Letter (GL) 88-11; GL 92-01, Revision 1; GL 92-01, Revision 1, Supplement 1; Regulatory Guide (RG) 1.99, Revision 2 (RG 1.99, Rev. 2); and Standard Review Plan (SRP) Section 5.3.2. GL 88-11 advised licensees that the NRC staff would use RG 1.99, Rev. 2, to review P-T limit curves. RG 1.99, Rev. 2, contains methodologies for determining the increase in transition temperature and the decrease in

upper-shelf energy resulting from neutron radiation. GL 92-01, Rev. 1, requested that licensees submit their reactor pressure vessel (RPV) data for their plants to the NRC staff for review. GL 92-01, Rev. 1, Supplement 1, requested that licensees provide and assess data from other licensees that could affect their RPV integrity evaluations. These data are used by the NRC staff as the basis for the review of P-T limit curves. Appendix G to 10 CFR Part 50 requires that P-T limit curves for the RPV be at least as conservative as those obtained by applying the methodology of Appendix G to Section XI of the ASME Boiler and Pressure Vessel Code, 1995 Edition through the 1996 Addenda.

SRP Section 5.3.2 provides an acceptable method of determining the P-T limit curves for ferritic materials in the beltline of the RPV based on the linear elastic fracture mechanics methodology of Appendix G to Section XI of the ASME Code. The basic parameter of this methodology is the stress intensity factor K_I , which is a function of the stress state and flaw configuration. Appendix G requires a safety factor of 2.0 on stress intensities resulting from reactor pressure during normal and transient operating conditions, and a safety factor of 1.5 for hydrostatic testing. Appendix G also requires a safety factor of 1.0 on stress intensities resulting from thermal loads for normal and transient operating conditions as well as for hydrostatic testing. The methods of Appendix G postulate the existence of a sharp surface flaw in the RPV that is normal to the direction of the maximum stress (i.e., of axial orientation). This flaw is postulated to have a depth that is equal to 1/4 of the RPV beltline thickness and a length equal to six times its depth. The critical locations in the RPV beltline region for calculating heatup and cooldown P-T curves are the 1/4 thickness (1/4T) and 3/4 thickness (3/4T) locations, which correspond to the maximum depth of the postulated inside surface and outside surface defects, respectively. The methodology found in Appendix G to Section XI of the ASME Code requires that licensees determine the adjusted reference temperature (ART or adjusted RT_{NDT}). The ART is defined as the sum of the initial (unirradiated) reference temperature (initial RT_{NDT}), the mean value of the adjustment in reference temperature caused by irradiation (ΔRT_{NDT}), and a margin (M) term.

The ΔRT_{NDT} is a product of chemistry and fluence factors. The chemistry factor is dependent upon the amount of copper and nickel in the material and may be determined from tables in RG 1.99, Rev. 2, or from surveillance data. The fluence factor is dependent upon the neutron fluence at the maximum postulated flaw depth. The margin term is dependent upon whether the initial RT_{NDT} is a plant-specific or a generic value and whether the chemistry factor was determined using the tables in RG 1.99, Rev. 2, or surveillance data. The margin term is used to account for uncertainties in the values of the initial RT_{NDT} , the copper and nickel contents, the fluence and the calculational procedures. RG 1.99, Revision 2, describes the methodology to be used in calculating the margin term.

3.0 TECHNICAL EVALUATION

As indicated in Section 1.0 above during the recent inspection of the RVCH, the licensee discovered flaws in CRD nozzles 29 and 30. Repairs to the nozzles are required. Evaluations supporting the repairs included a finite element analysis and a fracture mechanics analysis. The initial input assumptions of these evaluations included the cooldown pressure and temperature curves provided in Figure 3.4.3-2 of TS LCO 3.4.3. The results from initial evaluations concluded that the Code-required fatigue crack growth rate could be satisfied. However, the licensee recently discovered that the fracture toughness criteria of the 1989 ASME Section XI Code could not be met. To satisfy the fracture mechanics criteria (ASME Section XI, IWB-3612), the licensee needed to add restrictions on cooldown limits.

The licensee did not recognize the need to specify additional restrictions on the TS cooldown limits during contingency planning for the 2004 refueling outage. When crack indications were identified, detailed engineering packages were subsequently developed to address the technical concerns for the identified repair locations. On October 26, 2004, when engineers

were completing final reviews of the weld repair implementation modification package, it became apparent that additional restrictions were required in the TS.

To ensure integrity of the RVCH and the repairs to the CRD nozzles, the inputs to the finite element analysis were revised to include additional restrictions for the cooldown limits for reactor coolant water temperature. The additional restrictions for cooldown limits consist of (1) an addition of a 3 hour hold period between 110 °F and 135 °F and (2) an average cooldown rate of 20 °F/hour thereafter. The purpose of the 3 hour hold period is to reduce the thermal gradient across the RVCH material resulting from the TS allowed average cooldown rate of 40 °F/hour. The proposed temperature band for the 3 hour hold period was developed to provide plant operations flexibility while continuing to meet the applicable Code requirements. The purpose of the cooldown rate of 20 °F/hour is to prevent the thermal gradient and the resultant stresses across the RVCH material from being re-established.

The current TS no longer bounds the analysis supporting the repairs. Therefore, the licensee has proposed to add restrictions to TS LCO 3.4.3. The TS LCO 3.4.3 P-T limits with the existing cooldown rate limits will be maintained for the reactor vessel inlet. The additional restrictions only apply when the RVCH is on the reactor vessel. The purpose of the additional reactor coolant system (RCS) cooldown restriction is to protect the RVCH repair. Once the head is removed, RCS temperature does not impact the thermal gradient across the RVCH.

In order to satisfy the Code requirements for the repair of the CRD nozzles, the licensee proposed additional restrictions on cooldown limits. These additional restrictions on cooldown limits will not have any impact on 10 CFR Part 50, Appendix G criteria.

As stated above, the licensee cannot satisfy IWB-3612 using the current P-T limits for cooldown. In evaluating IWB-3612 criteria, the licensee recognized that cooldown limits needed to be further restricted. This is primarily because of the Palisades vessel upper head material properties. In evaluating the IWB-3612 criteria, the licensee has used conservative upper head material properties including higher initial RT_{NDT} . It should also be noted that using initial RT_{NDT} of 72 °F for upper head of the Palisade vessel is conservative and is unusually high compared to other pressurized-water reactor vessels.

It is important to note that the licensee did consider all of the vessel material properties while developing the existing P-T limits. These additional restrictions on cooldown limits are not due to high initial RT_{NDT} of the vessel upper head. Rather, the high initial RT_{NDT} values impacted the P-T limits because of IWB-3612 qualification. This qualification was required because of repairs to CRD nozzles 29 and 30. Therefore, the licensee has proposed restrictions to the cooldown limits in Section 3.4.3 of the TS.

As part of this safety evaluation, the NRC staff did not review the calculation using IWB-3612 criteria. However, based on the calculation provided using conservative assumptions on flaws and also on initial RT_{NDT} of the vessel head areas, the NRC staff finds that the licensee's actions in requesting for additional cooldown restrictions are technically sound and are conservative. In requesting the modifications of the current TS, the licensee did not change any criteria pertaining to the development of P-T limits. These additional restrictions on cooldown limitations will not have any adverse effect on reactor coolant pressure boundary. Therefore, the NRC staff finds the proposed changes to the TS acceptable.

4.0 EMERGENCY CIRCUMSTANCES

The Commission's regulations at 10 CFR 50.91 contain provisions for issuance of an amendment when the Commission finds that emergency circumstances exist, in that a licensee and the Commission must act quickly and that time does not permit the Commission to publish

a *Federal Register* notice allowing 30 days for prior public comment. The emergency exists in this case in that the proposed amendment is needed to allow the licensee to resume operation and increase power up to the plant's licensed power level.

The NRC staff has determined that the licensee used its best efforts to make a timely application and that the licensee could not reasonably have foreseen the problem that led to this license amendment request. On October 26, 2004, when the licensee was completing final reviews of the weld repair implementation modification package, it became apparent that additional restrictions were required to protect the integrity of the RVCH and the TS would have to be changed to reflect these additional restrictions.

The RVCH nozzle repairs are currently in progress, and they have been progressing faster than originally planned. The current schedule shows that the plant will enter Mode 5 as early as 1800 hours on November 8, 2004, with plant restart activities to continue immediately thereafter.

On October 28, 2004, the NRC verbally authorized two relief requests to support repairs to two control rod drive nozzle penetrations on PNPP's RVCH. The licensee had submitted the relief requests to the NRC on August 2, 2004. The NRC's authorization was contingent on the licensee submitting a license amendment request to include the additional cooldown requirements in the PNPP TS, and the NRC approving the license amendment request. Therefore, NRC approval of the license amendment is required for resumption of plant operation.

Accordingly, the Commission has determined that emergency circumstances exist pursuant to 10 CFR 50.91(a)(5) and could not have been avoided, that the submittal of information was timely, and that the licensee did not create the emergency condition.

5.0 REGULATORY COMMITMENTS

There are no new commitments and no revisions to existing commitments. However, this request completes the commitment made by letter dated October 28, 2004, from the licensee to the NRC, to provide this license amendment request.

6.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulation at 10 CFR Section 50.92(c) states that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) result in a significant reduction in a margin of safety. The NRC staff has made a final determination that no significant hazards consideration is involved for the proposed amendment and that the amendment should be issued as allowed by the criteria contained in 10 CFR 50.91. The NRC staff's final determination is presented below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed license amendment provides additional restrictions to the cooldown rate

limits in Technical Specification (TS) Limiting Condition for Operation (LCO) 3.4.3, "Primary Coolant System (PCS) Pressure and Temperature (P/T) Limits." The proposed cooldown rate limits are in addition to the present cooldown rate limits provided by LCO 3.4.3. Operating the facility in accordance with the proposed additional restrictions on cooldown rate will ensure that stresses caused by the thermal gradient through the reactor vessel closure head (RVCH) remain bounded by the stress analyses.

The proposed amendment does not involve operation of required structures, systems, or components (SSCs) in a manner or configuration different than previously recognized or evaluated. Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed amendment does not involve a physical alteration of any SSC or a change in the way any SSC is operated. The proposed amendment does not involve operation of any required SSCs in a manner or configuration different from those previously recognized or evaluated. No new failure mechanisms will be introduced by the changes being requested.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

The proposed amendment does not affect any margin of safety. The proposed additional restrictions to the cooldown requirements ensure that stresses caused by the thermal gradient through the RVCH remain bounded by the stress analyses. Therefore, the proposed amendment would not involve a significant reduction in a margin of safety.

Based on the above evaluation, the NRC staff has concluded that the proposed TS change involves no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of no significant hazards consideration is justified.

7.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Michigan State official was notified of the proposed issuance of the amendment. The Michigan State official had no comments.

8.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluent that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final finding that the amendment involves no significant hazards consideration. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

9.0 CONCLUSION

The NRC staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: N. Ray

Date: November 8, 2004